



Your 24 hour a day source for weather information across Central Indiana

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Volume 7, Issue 3



Severe Weather Season 2005 Summary

By Andrea Lammers, Student Volunteer

The 2005 severe weather season started off slow with only a few severe storms in March and April producing gusty winds and hail. In May, however, the storm season picked up with about three major severe weather events. These storms produced a mixture of threats including large hail, straight line winds, heavy rains that resulted in flash flooding, and even some funnel clouds. Actual tornadoes did not arrive until



Above: Lightning Strikes near Attica, Indiana.

mid-June, however, when remnants of Hurricane Arlene spawned two tornadoes (F1 and F0) in Indiana. June had other significant weather events at the beginning and ending of the month characterized by large hail and damaging winds.

Most of the heavy rainfall across central Indiana during the 2005 storm season was associated with remnants of major hurricanes and July was no exception. Flash flooding occurred on July 16 as Hurricane Dennis brought heavy rainfall to the Indianapolis area. Rainfall amounts of 2 to 4 inches were reported as nearly stationary thunderstorms formed in a very moist air mass left behind by Hurricane Dennis. Reports from the Indianapolis Star on this flash flooding event included about 20 cars stuck in five feet of water in the Lafayette Square Mall parking lot. Besides hazardous roadways, the flash flooding also caused 1,600 electricity customers to lose power at least briefly.

The next occurrence of severe weather in July was a pair of severe thunderstorm lines that raced across Indiana, one on the evening of July 20th and the other on the evening of July 21st. The first line of storms that occurred on July 20th mainly caused heavy rains and high winds during the evening and overnight hours. One truck driver reported a 67 mph wind gust on Interstate 70. Lebanon and Lafayette experienced flash flooding from this event. The 2nd line of severe thunderstorms passed through the area on the evening of July 21st bringing high winds and heavy rain just as the previous line of storms on the 20th. A spotter called in a rainfall rate greater than one inch per hour near Elizaville (Boone County). In addition, however, the July 21st

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Severe Weather Summary—Continued



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event also had frequent cloud-to-ground lightning. Numerous trees and power lines across central Indiana were blown down by these thunderstorms.

The main severe weather event of the month was on July 26th when four tornadoes were spawned along the leading edge of a large bow echo. The bow echo or u-shaped line of thunderstorms are known to cause damaging winds. In this case, they not only caused widespread wind damage across central Indiana, but also produced brief tornadoes during the evening of the 26th. The first tornado was an F0 which touched down just east of the intersection of Interstate 65 and State Road 38 in Dayton. Thirty minutes later an F1 tornado touched down on the northeast side of Frankfort and an F0 tornado landed near the Champagne Shores Subdivision in Kokomo. The last tornado from this event occurred in Michigantown and was an F0. The tornadoes all caused mild structural damage to mobile homes and garages, and moved a few trailers and mobile homes. Sixteen spotters helped verify the tornadoes along with the damage cause by the tornadoes, straight line winds, and hail.

The month of August was fairly uneventful as far as development of strong thunderstorms and tornadoes. However, an unusual amount of dangerous lightning events occurred sporadically throughout the month causing fires, injuries, and even death in one case. The first lightning event happened on August 8 as strong to severe storms moved through central Indiana that afternoon. Lightning struck a home in Carmel on this occasion causing a fire. Ironically, the home had been the victim of another lightning-induced fire just three weeks beforehand.



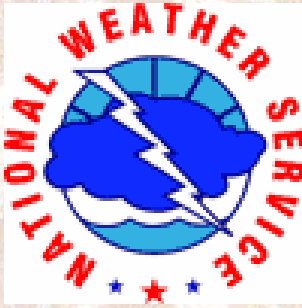
Above: This low hanging cloud was spotted one mile east of Greentown, Indiana on July 16. To be classified as a funnel cloud, the cloud must have rotation and be a persistent feature.

The only significant severe weather event associated with severe thunderstorms during the month of August occurred on August 11th. The severe thunderstorms moved through central Indiana on the afternoon and evening of the 11th causing mostly wind damage along with flash flooding in a few places. Also, lightning was a threat with this line of storms as it struck two men fishing from a canoe on Sugar Creek. Both were injured, one of them seriously.

The final lightning event of the month happened on August 14th in which a man from Muncie was struck and killed by lightning early Saturday morning in the parking lot of a local bar.

To end the month of August, remnants of Hurricane Katrina brought some much needed rainfall. In many cases, however, the rainfall

(Continued on page 3)



Severe Weather Summary—Continued



Above: Straight line winds pushed over this trailer (as well as others) in Kokomo in the early morning hours on November 6.

mostly wind damage. Damage from this event was minimal only knocking down a few trees, limbs, and power lines.

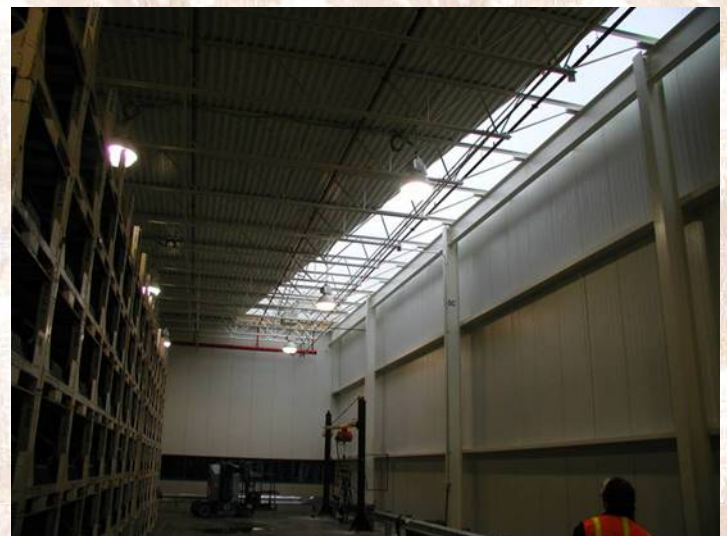
The most recent severe weather event occurred during the early morning hours of November 6th, as a strong line of thunderstorms pushed across Central Indiana. The storms produced widespread wind damage across our state, toppling trees and power lines. Hail up to 1 inch in diameter was reported and a wind gust of 58 mph was reported at the Indianapolis International Airport. Several Amateur Radio Spotters reported wind gusts to between 60 and 65 mph. The storms spawned tornadoes across Southwest Indiana, near Evansville, and killed over 20 people.

Spotter participation has been great for the 2005 severe weather season. Remember the National Weather Service relies on spotters to provide the ground truth information of what is actually happening. Spotters are a vital component for the weather service to be able to issue severe weather warnings. You can submit spotter reports via our Severe Weather hotline, email, or via the E-spotter program. We thank you for all your support and hard work this spring. Keep up the great work!

(Continued from page 2)

came too quickly and in high quantity resulting in areal flooding across many areas of south central Indiana. Rainfall of 3.82 inches of occurred in Bicknell, and 4.20 inches of rain was measured near Spencer. These locations were in the area hit hardest, in a southwest to northeast corridor from Vincennes to Indianapolis and Muncie.

September 2005 only had one significant severe weather event as the severe weather season was winding down. On September 19th, a line of severe thunderstorms moved across central Indiana causing



Above: Straight line winds peeled back the roof in this plant in Kokomo on November 6.



Winter Weather Preparedness Week



By Mindi Wisker, Student Volunteer

Indiana Winter Weather Preparedness Week November 13-19, 2005

Winter Weather Preparedness Week is an activity of the National Weather Service (NWS). One week a year is dedicated to alert Indiana citizens of severe weather that can occur during the winter months and how to safely avoid getting into danger.

Preparation is an important part of this week. You should always have a winter weather survival kit with you, whether in your car or at home. Just a few of the items should be a flashlight, NOAA Weather Radio, extra food and water, and a tool kit.

Tips for avoiding frostbite, heat loss, and hypothermia are included in this week's topics, including how to calculate the Wind Chill. Finding time to check the weather and properly prepare yourself can decrease your chances of serious injury.

During this week, many topics will be discussed. Winter weather terms will be defined and discussed. Have you ever wondered about



Above : Ice coats this tree in a January 2002 storm.



Above: Flooding in January 2005.

the difference between a Winter Storm Watch and a Winter Storm Warning?

A Winter Storm Watch is issued when there is a possibility of winter storm events such as blizzards, heavy snow, significant freezing rain, and/or sleet, but a Winter Storm Warning is issued when heavy snow or a mixture of heavy snow, freezing rain, and/or sleet is expected.

Flooding is the most hazardous weather event. Rainfall and snowmelt often together contribute to produce flooding. Taking serious precautions during the late winter and early spring months can save your life!

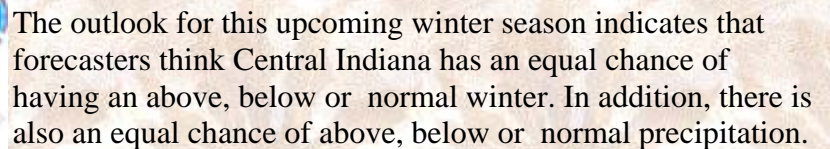
Road conditions can be found by calling the Indiana State Police Hotline between December 1st and March 31st at (317) 232-8298. You can also visit the Indiana Department of Transportation's TrafficWise website at <http://www.in.gov/dot/div/trafficwise/>.

More information can be found by visiting the NWS Winter Weather Preparedness Website at http://www.crh.noaa.gov/images/ind/winter_weather_preparedness_2005.pdf

Remember to stay safe and have fun during this wonderful time of year!



The Climate Prediction Center is the division of the National Weather Service responsible for long range forecasting. Each year, they issue seasonal outlooks for temperature and precipitation across the United States.



Above: The Temperature Outlook for the United States for this Winter.

While there is an equal chance of above or below normal temperatures this winter, don't think that means every day

Precipitation Outlook
Winter (Dec. - Feb.) 2005/06

Chances for **Wetter** or **Drier** than Normal Conditions (based on 1971-2000)

Equal Chances: Most of the United States.

Wetter:
 - Alaska: **>60%**
 - Gulf of Mexico: **>60%, >55%, >50%**

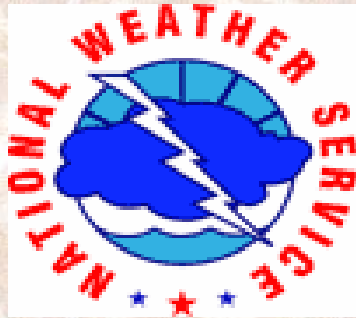
"Equal Chances" --
 50% chance for wetter than normal,
 & 50% chance for drier than normal

Issued:
October 20, 2005

Above: The Precipitation Outlook for the United States for this Winter.

to create any firm long range prediction! The end result is the “EC” you see on the outlook graphic – Equal Chances.

With no real favorite for winter time precipitation, forecasters and the public alike should prepare themselves for no guarantees in the upcoming winter months!



Winter Weather Puzzle



By Jamie Bielinski, Meteorologist

A T X J C S E K V Q B X W J G K
V P L H I B C J N M R M Z C I J
G R A U P E L O R F Z R L A F O
U W Q R B D Y T E E L S P B R S
B N K I C E S T O R M Q L H E P
S I T L R T A Y D S P I J F E I
W D M B H W I D N O Z O G K Z N
E J K Q O U E C E Z P N L Z I Q
Z R C N S H A M A Y T C X Y N L
V E S V G E F R F I U C J D G T
A T G F O X D W E V R I X L R U
X N K Y F R O S T H W M U P A M
G I Z V H T D L L I H C D N I W
T W U Q G F S O I N B R W A N R

Words to find:

Blizzard	Snow	Sleet	Freezing rain
Ice storm	Frost	Winter	Wind Chill
Arctic air	Graupel		



An Active Hurricane Season—the effects on Central Indiana



By John Kwiatkowski, Science and Operations Officer

As everyone knows, the southern United States was struck by a number of hurricanes and tropical storms this year. However, you may not be aware that some of these arrived in modified form over Indiana, playing a major role in our summer weather.

Usually remnants of hurricanes or tropical storms pass Indiana once or twice a year, in the late summer or early fall. Fortunately for us, by the time they arrive they are far from their energy source over the Gulf of Mexico and have lost almost all of their wind power.

However, systems originating in the tropics often retain plenty of moisture when they reach Indiana. They are apt to bring us wet, sometimes *very* wet weather. The

rainiest day in Indianapolis history, September 1, 2003, resulted from a former hurricane dropping 7.20 inches of water. This year there were four times when systems that had previously been tropical storms or hurricanes brought significant moisture to the Hoosier State.

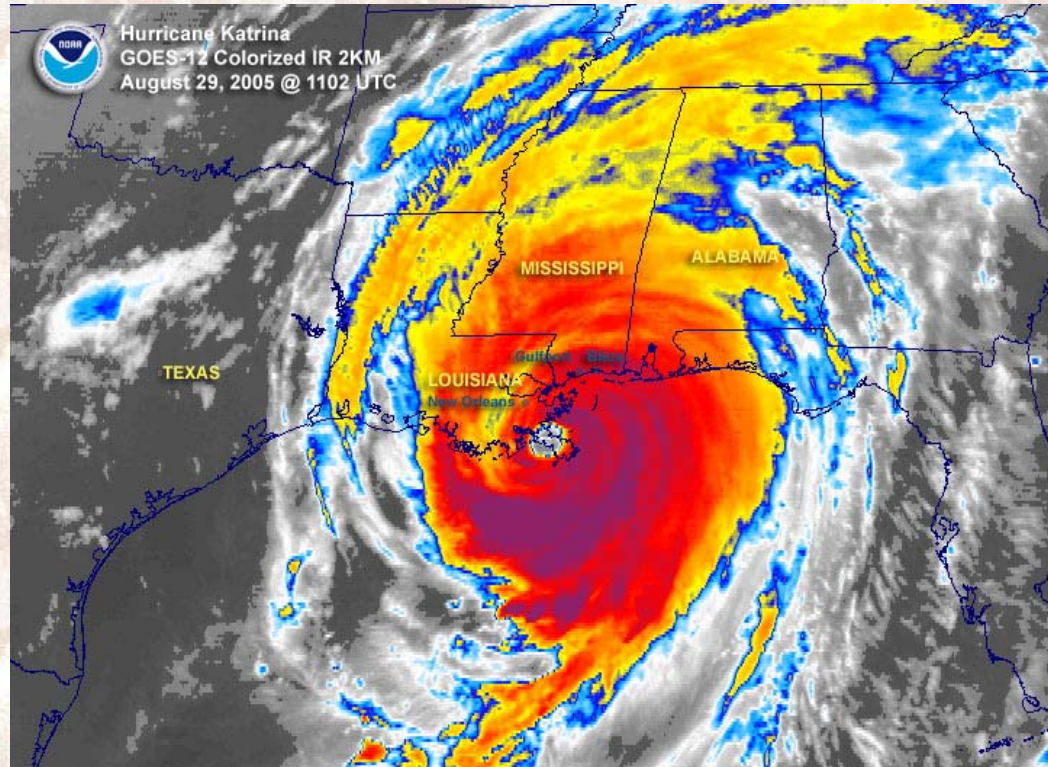
The first event in our “hurricane season” was unusually early. From June 12 into June 13, Tropical Storm Arlene left 3.12 inches of rain at Indianapolis. Total June rain was 3.59 inches. Arlene also spawned two small tornadoes. Besides heavy rain, twisters can result from tropical systems. This is relatively rare, and as with Arlene, any tropical system tornadoes are usually weak.

After Arlene, only .34 inch of rain was observed at Indianapolis through July 10. Then Hurricane Dennis, or what was left of it, arrived. Rainfall from Dennis was erratic, but from July 11 through July 17, 1.49 inches fell at Indianapolis. This was half the total for July, and about a third the July average.

After mid July, Indiana was not affected by a tropical system for several weeks. But on August 30 and 31, former Hurricane Katrina put 2.23 inches of moisture in the Indianapolis rain gage—more than half the August total. After another lull, rain originating from Hurricane Rita amounted to 1.96 inches on September 25 and 26.

To sum up, former tropical storms and hurricanes brought Indianapolis 8.80 inches of rain out of a total of 15.44 inches for June through September. Average of precipitation for that period is 15.25 inches.

Not every Hoosier got the rain Indianapolis did, and growing conditions for the summer were not ideal across the state. But in some sense, the tropical systems that caused so much misery elsewhere helped our state avoid what could have been a very serious drought.



Above: Hurricane Katrina makes landfall near New Orleans on the morning of August 29 2005.



Ask a Meteorologist about NWS Services



Dear NWS Meteorologists -

I know that when a hurricane becomes deadly and or costly, the name is likely the retire (probably like Hurricane Dennis). Can you tell me the process of how another name is to be chosen to place the retired name? How do they propose some replacement names? What sources to they get the name? And what criteria of the name should it contain (Language of origin, ect...)

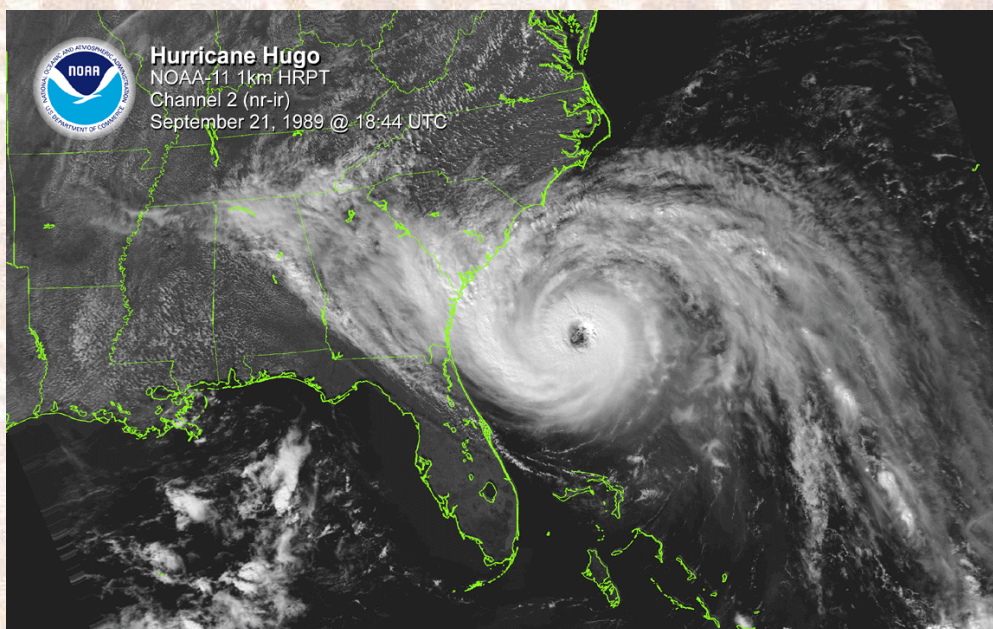
Thanks,
Charles
Audience Viewer

Charles -

Thanks for your interest. Below I have cut and pasted an excerpt from the National Hurricane Center's webpage that answers your questions. The web page can be found at:

<http://www.nhc.noaa.gov/aboutnames.shtml>

Experience shows that the use of short, distinctive given names in written as well as spoken communications is quicker and less subject to error than the older more cumbersome latitude-longitude identification methods. These advantages are especially important in exchanging detailed storm information between hundreds of widely scattered stations, coastal bases, and ships at sea.



Above : Hurricane Hugo targets South Carolina in 1989. 'Hugo' is a retired hurricane name, and has not been used since.

Since 1953, Atlantic tropical storms have been named from lists originated by the National Hurricane Center and now maintained and updated by an international committee of the World Meteorological Organization <http://www.wmo.ch>. The lists featured only women's names until 1979, when men's and women's names were alternated. Six lists are used in rotation. Thus, the 2004 list will be used again in 2010. Here is more information on the history of naming hurricanes. <http://www.aoml.noaa.gov/general/lib/reason.html>

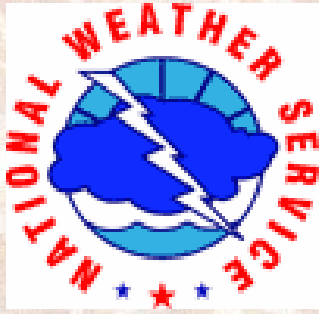
The only time that there is a change in the list is if a storm is so deadly or costly that the future use of its name on a different storm would be inappropriate for reasons of sensitivity. If that occurs, then at an annual meeting by the WMO committee (called primarily to discuss many other issues) the offending name is stricken from the list and another name is selected to replace it.

Several names have been changed since the lists were last used. Four names from the 1995 list have been retired. On the 2001 list, Lorenzo has replaced Luis, Michelle has replaced Marilyn, Olga has replaced Opal, and Rebekah has replaced Roxanne. Three names from the 1996 list have been retired. On the 2002 list, Cristobal has replaced Cesar, Fay has replaced Fran, and Hanna has replaced Hortense. Two names from the 1998 list have been retired. On the 2004 list, Gaston has replaced Georges and Matthew has replaced Mitch. On the 2006 list, Kirk has replaced Keith. Here is more information on the retirement of hurricane names <http://www.nhc.noaa.gov/retirednames.shtml>.

Hope this helps!

- Jason

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Ask a Meteorologist about NWS Services - Continued



(Continued from page 8)
NWS Meteorologist -

I was wondering what really cause the segregation of the three cells [Hadley cell; Ferrel cell; and Polar cell] in 30 degrees each. From my readings, it explains that the "direction and location of these wind belts are determined by solar radiation and the rotation of the earth." Please help me understand more of this. Why at 30 degree? Why not at 20 or 40 or 45? Are the definition of the cells based from model or actual observation of atmospheric phenomena?
Thank you very much in advance.

Alex L -from the Philippines

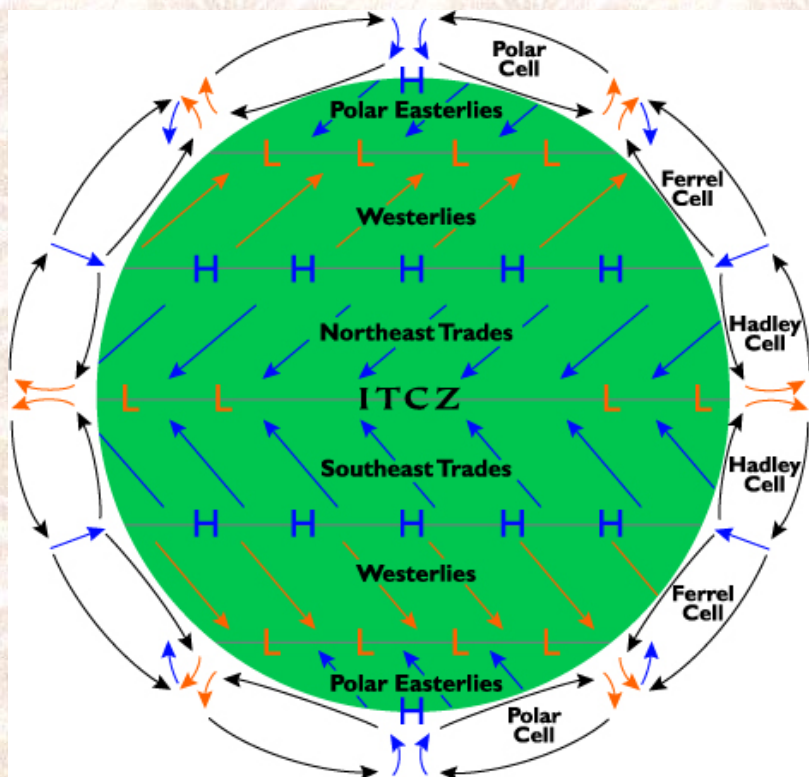
Alex -

I will try an answer your questions the best I can. I went back to my old college textbooks to try and find some answers for

you, but all I found was a bunch of equations, and I'm not sure the answer is really there.

Anyways, the best reason that I can find for sinking air in a Hadley Cell at 30 degrees latitude is because as a parcel of air mixes it becomes cooler than the environment. As we know, cold air sinks, so these parcels sink at about 30 degrees. My guess for the reason air does not sink at 20 degrees is because parcels at that latitude are not yet cool enough to sink. The parcel has not lost enough of the max heating from the equator to begin to sink and surrounding parcels remain colder until about 30 degrees. That's when the descent in the circulation begins.

Hadley Cells have been modeled and observed. The ITCZ (Intertropical Convergence Zone) marks the location where lower level convergence is taking place near the equator. This zone moves a bit with the seasons. You can see it in Satellite pictures as clusters of thunderstorms in roughly the same latitude near the equator. Hadley Cells are also



Above: Diagram of the general atmospheric circulation.

responsible for the easterly trade winds in the tropics. This is more evidence of the cells.

The Northern polar cells push cold air south along the earth's surface from the north pole. As these parcels push south, they receive more heating, warm and eventually become warmer than the rest of the environment. Here parcels will start to rise, this tends to be at about 60 degrees of latitude.

In between the Hadley and Polar cells are the Ferrel Cells. It seems you have a good handle on the cells, but I think the best reason for why they border each other at these 30 degree latitudes is because it is at these locations where the parcels

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Ask a Meteorologist about NWS Services - Continued



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cool/warm enough so that they may sink/rise as compared to other parcels in the atmosphere.

I think it is important to realize that in the real world these cells are not stationary or fixed. We see plenty of fluctuations in them provided by the polar and subtropical jet streams that can change their positions regularly. Seasonal influences matter too. Here in the Northern Hemisphere, we never see the polar jet in the summer time in the mid latitudes. The high angle of the sun allows too much warming of the atmosphere to allow it to dip south.

I found the following pages on the Internet to be informative on this topic also.

http://www.absoluteastronomy.com/encyclopedia/a/at/atmospheric_circulation.htm

http://www.absoluteastronomy.com/encyclopedia/h/ha/hadley_cell.htm

<http://www.answers.com/topic/hadley-cell>

I hope this helps you.

- Jason

Dear Meteorologist -

Why is the Pacific Northwest (Washington, Oregon, Idaho, northern California) so sunny and dry in the summer when other parts of the country (including monsoonal moisture in the southwest) either get regular rain (northeast/southeast) or thunderstorms (midwest, Rockies)?

- Dan

Dan —

Thanks for your question.

You answered part of your question already. The American Southwest is wetter in the summer due to monsoonal moisture. The Midwest will get thunderstorms due to gulf moisture and daytime heating in the summertime. A typical southerly flow across the Midwest state results in warm...moist gulf of Mexico air in place. This combined with daytime heating in the summertime is a good recipe for afternoon thunderstorms.

The northwest stays dry at this time of the year mainly because most of the storms that bring rains to that area move along the jet stream. In the summer months, the jet usually is shifted farther north than Washington...Oregon...Idaho and Northern California. This steers many of the rain providing storms north of that area.

Don't worry. Come Fall, the jet will begin to shift back to the south, and rains will return to the typically rainy American northwest.

Hope that answers your question.

- Jason

Have you ever had a question about the weather? I'll bet that you have! Isn't there an old saying that goes there's never a meteorologist around when you need one? Well, now here is your chance. In this section of the newsletter, our staff of meteorologists will try our hardest to answer any and all of your questions concerning Meteorology. I can tell you now that we will not have all the answers, but we will certainly try our best. If you have a question, please send it to our [Editor](#). We will try to answer all questions, and some of the most interesting or common questions and answers will be printed in the next newsletter.



News/Notes



Day Long Spotter Talk!

Coming to Indianapolis March 18, 2006, an event featuring talks from chasers, local meteorologists, and severe weather experts.

Watch our website for more details as they become available.



Spotters! Remember, this newsletter is for you! You could be a guest columnist in our next issue of "SKYWATCH". If you have an interesting weather story or storm chasing experience to share with the other spotters, submit it to our [editor](#), or our [webmaster](#).

Please keep any submissions to one page of typewritten text. We are also always looking for pictures of hail, tornados and storm damage that occurred in Central Indiana. Feel free to send those items also. Any photos submitted may be included in the next edition of Skywatch. We try to give credit for photo submissions where possible. The next issue of "SKYWATCH" is planned for early spring.

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